



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : James R. Kittrell                      Confirmation No.: 3692  
Serial No. : 09/684,173  
Filed : October 6, 2000  
TC/A.U. : 1711  
Examiner : Thao T. Tran

Docket No. : 00-625  
Customer No.: 34704

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313

DECLARATION OF JAMES R KITTRELL

I, JAMES R. KITTRELL, do hereby declare that I conceived and invented the subject matter claimed in claims 27 and 28 of the instant application and also conceived and invented the common subject matter disclosed and not claimed in U.S. Patents 6,464,951 and 6,179,971.

The undersigned declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2/27/06  
Date

James R. Kittrell  
James R. Kittrell

PRESIDENT  
Name and Title



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DECLARATION UNDER 37 C.F.R. 1.132

JAMES R. KITTREL, hereby declares as follows:

That, he is the inventor of U.S. Patent Application Serial No. 09/684,173 filed October 6, 2000 for a TWO STAGE PROCESS AND APPARATUS FOR PHOTOCATALYTIC AND CATALYTIC CONVERSION OF CONTAMINANTS;

That, he is intimately familiar with and has read the subject matter of U.S. Patent 6,086,749, applied by the Examiner in the Examiner's Office Actions dated November 9, 2005, and he does not believe that said references taken alone or in combination teach, suggest or make obvious the invention claimed in the above-identified application;

That, the catalyst support composition claimed in the above-identified application exhibits superior catalyst activity when compared to the hydrotreatment catalysts disclosed in the

cited prior art reference, particularly with respect to converting contaminants in a gas stream;

That, the teachings of the prior art fails to suggest or appreciate the criticality of the combination of silica, titania and tungsten oxide in the catalyst support for improving the removal of contaminants from a gaseous stream; and

That, the teachings of the prior art references fail to suggest or appreciate the criticality of silica to the catalytic activity in combination with tungsten oxide and titania;

That, as evidence supporting the foregoing unexpected results, Declarant offers the following comparative test results to demonstrate the criticality of silica in combination with titania and tungsten oxide on catalyst activity.

An impregnated catalyst (Catalyst 1) was prepared by forming a solution of 35 g. silicotungstic acid hydrate and 126.7 ml water. The solution was impregnated into 100g of titania support. The impregnated catalyst was dried and calcined at a 450°C terminal temperature. The impregnated catalyst was then crushed and sieved. Tetraamine platinum nitrate was then added in the amount necessary to achieve a 1% platinum loading. The impregnated catalyst was dried and calcined at a 400°C terminal temperature.

A second catalyst (Catalyst 2) was prepared by forming a solution of 25.7 g sodium tungstate and 108 ml water. The

solution was impregnated into 60g of titania support. The impregnated catalyst was dried and calcined at a 450°C terminal temperature. The impregnated catalyst was then crushed and sieved. Tetraamine platinum nitrate was then added in the amount necessary to achieve a 1% platinum loading. The impregnated catalyst was dried and calcined at a 400°C terminal temperature.

Each of the catalysts were placed individually in a tubular reactor having an outer diameter selected within the range from 15.8 to 28.4 mm, in an amount of 20cc. The reactors were completely immersed in a water bath. The temperature of the water bath was controlled by a PID micromega controller. Each of the two reactors, each of which contained one of said catalysts, had an arrangement for the introduction of the air stream containing organic contaminant and the removal of the purified air stream.

Air was supplied to the reactors, operated in parallel, by an air compressor. All or a portion of the air could be diverted through a saturator to add formaldehyde to the stream to obtain the desired reactor inlet concentration. The temperature of this jacketed saturator was controlled by circulation through the jacket of a glycol stream from a temperature controlled Lauda Refrigerating Circulator Bath. By control of the saturator air flow rate and the saturator

temperature, any desired concentration of contaminant can be achieved in the main air flow stream to the thermo catalytic reactor. The total air flow to the reactor was maintained by a flow controller.

An air stream at about 25°C, containing about 10 ppm, of formaldehyde at about 40% relative humidity was introduced into each glass reactor at about 1 atm. pressure and passed through the reaction zone. In one reactor, approximately 20 cm<sup>3</sup> of Catalyst 1 of a size range of 8 to 12 mesh was inserted in the reaction zone of the glass reactor. In the second reactor, approximately 20 cm<sup>3</sup> of Catalyst 2 of a size range of 8 to 12 mesh was inserted into the reaction zone of the reactor. At steady state, the reactor outlet was analyzed for the concentration of unreacted formaldehyde.

The results are as follows:

Catalyst	Tunsten, oxide Wt %	Silica Wt %	Titania Wt %	Catalyst Activity, min <sup>-1</sup>	Space Velocity Hours <sup>-1</sup>	Formaldehyde Conversion, %	Reaction Temperature, °C
Catalyst 1	17	0.2	70	2814	52500	96.2	22
Catalyst 2	16	0	70	100	22500	23.4	23

The results are surprising, and show that there is an extremely strong dependence of catalyst activity on the relative amounts of silicon and titania in the catalyst. A small amount of silica is very beneficial to catalyst performance. It is clear that the silica is necessary for a significant reaction to occur. The catalyst of the present invention contains silica, tungsten oxide, titanium, oxygen, and platinum. With five components, it is not possible to predict, or even to determine by routine experimentation, the proper combination of amounts of each of these five constituents, particularly when such small changes in composition of silica cause such large effects on catalyst performance.

The foregoing test data clearly establishes the criticality of the claimed catalyst support composition of the present invention on catalyst activity. The sum total teachings of the cited prior art document does not appreciate the advantages obtained by providing a catalyst composition of the independent claim nor the benefits obtained on catalyst activity and resulting from even a small amount of silica in combination with titania and tungsten oxide.

The undersigned declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.